I. Student Learning Outcomes:

Note that items in gray are common to both majors.

Our students that graduate with either a B.S. or a B.A. in the Mathematical Sciences will…

1. Demonstrate a solid understanding of differential (1A), integral (1B) and multivariable (1C) calculus, and be able to apply these concepts to a variety of problems.

2. Demonstrate a solid understanding of vector calculus (2A), linear algebra (2B), ordinary differential equations (2C), higher level algebra (2D) and analysis (2E), and be able to apply these concepts to a variety of problems.

3. Be able to think analytically and critically and to formulate problems, solve them, and interpret their solutions.

4. Achieve an understanding of the nature of proof, in particular should demonstrate a good understanding of rigorous mathematical proof (reading and writing), and apply reasoning based on definitions, axioms, theorems and induction.

5. Communicate effectively in writing.

6. Have experience applying knowledge from one branch of mathematics to another and from mathematics to other disciplines.
Our students that graduate with either a B.S. or a B.A. in the Mathematical Sciences (Actuarial) will...

1. Demonstrate a solid understanding of differential (1A), integral (1B) and multivariable (1C) calculus, and be able to apply these concepts to a variety of problems.
2. Demonstrate a solid understanding of vector calculus (2A), linear algebra (2B), and ordinary differential equations (2C), and be able to apply these concepts to a variety of problems.
3. Be able to think analytically and critically and to formulate problems, solve them, and interpret their solutions.
4. Prepare for and complete the two exams offered by the Society of Actuaries (1-Financial Mathematics, and 2-Probability and Statistics).
5. Communicate effectively in writing.
6. Have experience applying knowledge from one branch of mathematics to another and from mathematics to other disciplines.

II. Which Learning Outcomes were Assessed?

The learning outcomes assessed were items 1A and 3 for all math majors in Math 181 (Calculus I) by individual faculty. Item 4 for BS or BA in Actuarial Science through data collected from the program coordinator regarding the Society of Actuary Exams.

III. How were they assessed?

An assessment sheet was sent to individual instructor of the selected course(s). The instructor is asked to fill out the sheet, focusing on the learning objectives and related outcomes from the final evaluation of the course. The assessment sheet is consisted of three parts – enrollment and overall performance of students for the course, achievement of learning outcomes for the final exam/evaluation, and expected learning outcomes of the course.

The instructions for the assessment sheet are as follows. First, fill out the course information (course number, section, and name of the course) and instructor’s name. For Part I, put the total number of students (who took the final exam), the number of students who passed (i.e., non-failed) with the number of students who got above a grade of C or better and C– or below, respectively, and the number of students who failed (F). For Part II, instructor put the number of learning outcome(s) and corresponding final exam question(s). Then, put percentage of students for each category using 5-number rubric scale (0-4). In Part III, instructor lists the initial learning outcomes set-up from the course syllabus.

IV. Undergraduate programs should assess at least one University Undergraduate Learning Outcome (UULO) each year, which may or may not overlap with a program learning outcome.
The “Inquiry and Critical Thinking” UULO can be assessed with items 1, 2, 3, 4 and 6. We directly assessed items 1A and 3 (as noted above).

V. What was learned from the assessment results?

For the 19 sections of Math 181 taught Spring (8) and Fall 2016 (11), 8 sections of instructors from the fall semester reported results. Collectively speaking, even though this may not be enough data to make any valid conclusions for the entire year for the assessment and the results vary with individual instructor, but these provide meaningful numbers and valuable observations about the assessment for the one of the most important and essential courses in the undergraduate math program. Based on the limited numbers, the passing rate for the course for Fall 2016 is approximately 65.87% and C or better is 50.76%. In regard to the learning outcomes by individual instructors, the distribution for each category from 5 to 0 shows approximately mound shapes except learning outcomes related to calculation of derivatives and integration, which might indicate the fact that students who passed the course with C- or below (approx. 25% - 30%) would have insufficient sustainable foundation or required to retake the course. (Most of sciences and engineering majors require to have C or better.)

For the Actuarial Society Exams, four students (Joung Kwak, Justus Tulowiecki, Linglang Ma, and Ryan Meier) passed exam P, three students (Joung Kwak, Justus Tulowiecki, and Ryan Meier) passed exam FM. Considering the depth and difficulty of these exams, we are very pleased with the results.

VI. How did the program respond to what was learned?

There is continued difficulty in collecting meaningful data that can be compared across different sections (and hence different instructors). The assessment committee is continuing to try and find creative solutions to this problem. To promote faculty engagement for the assessment, we would like to have faculty members have habit to submit the assessment report. Furthermore, we hope to encourage sharing the data we collect. In addition, it is strongly recommended to have some opportunities for math faculty members to learn about the understanding assessment such as what the assessment is, how the assessment is different from evaluation? measures of assessment, and so on.
I. Enrollment & Overall Performance:
Total no. of students: _______ (1) No. of Passed: _______ (C or above: _______ C– or below: _______ ) (2) No. of Failed: _______

II. Learning Outcomes:

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Final Exam Question</th>
<th>Percentage for category: 0-4 (5-rubric scale)</th>
<th>Remark</th>
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<tbody>
<tr>
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<td>4 (Satisfactory)</td>
<td>3 (Above average)</td>
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III. Expected Learning Outcomes from your syllabus:
1
2
3
4
5
6
7
8

Note: Percentages for category in the above table do not have to be “exact.” Approximated values that add up to 100% would be ok.